"The weed problem is basically a botanical problem and it is necessary to approach it from the botanical standpoint" was a remark which summed up the speaker's experience. A lively discussion followed the speaker's paper. Mr. M. W. Talbot of the United States Forest Experiment Station agreed with the speaker in emphasizing the need of chemical training on the part of the investigator of weeds. Professor W. W. Mackie thought that grazing might control Camel Thorn, since on his Asiatic expedition it was the sole resource of the camels in his camel train. It was his belief that introduction was caused through the camel dung around the roots of the date palms brought into the Coachella Valley from the Old World. Professor W. L. Jepson pointed out the need of reports to the state authorities of the first presence of alien weeds. It is not many years ago, as time goes, he said, that on their first appearance in California all of these weeds were reported by botanists as occurring at a single station and occupying only a limited area, sometimes only a few square yards. Such narrow infection could, at the beginning, have easily been smothered. In the case of new aliens immediate eradication, he urged, should be a policy for the future. Several other members took part in the discussion. Adjournment was at 9:30.—W. L. J.

THE ANNUAL DINNER FOR 1932

The general session of the California Botanical Society met February 27, 1932, in Room 2093, Life Sciences Building, University of California, at 2:00 p. m. Dr. George J. Peirce, President of the Society, occupied the chair until near the end of the session when he was relieved by Professor H. E. McMinn, the First Vice-President. The following papers were read and discussed.

Some facts of interest extracted from a comparative study of Viola hybrids. By Dr. Jens Clausen, Carnegie Institution of Washington.

Certain phases of protein hydrolysis by the Dermatophyte Fungi. By Mr. David Goddard, Department of Botany, University of California.

Palaeobotanical evidence of the origin of floristic differentiation in the California flora. Mr. H. L. Mason, Department of Botany, University of California. Vegetation is in process of continuous change. Each species induces conditions in the environment that are unfavorable for the establishment of competitors, including those of its own kind. Climate also is constantly changing. The physiological limits of an organism restrict its activities to a relatively narrow range of environmental conditions. If the environment changes there are three courses open to the plant. It may adapt itself to the new conditions, it may migrate, or it may perish and become extinct.

The physiological limits are not the same for all species. Some may have a wide range of tolerance for a given set of conditions and others a narrow range. In any given habitat some species may be near one extreme of their tolerance range and others may be near the other extreme. It is evident, therefore, that any change in the environmental complex would exercise a selective influence on the specific content of the plant association. Some species would die out. Others would find conditions nearer their optimum and would tend to dominate the area. Still others would be brought nearer the extremes of their tolerance range and would be forced into a less conspicuous position. It seems therefore that the theory of physiological limits as developed by Livingston and Shreve, and the theory of tolerance as postulated by Goode offer the mechanism of response that permits of changing floras.

There exists in the Sierra Nevada a coniferous forest zonated according to climate. In its northern aspect it is strikingly like the redwood forest of the Coast Ranges. It lacks Sequoia sempervirens, however. One cannot escape the evidences of relationship. Tertiary records of western America are abundant in remains of species identical with or closely related to those now segregated into separate forest associations. The Pliocene Santa Clara lake beds of the Santa Cruz Mountains are a striking example where there is found in association Sequoia Langsdorfii, Pseudotsuga taxifolia, Pinus Lambertiana, Libocedrus decurrens, Arbutus, as well as several other genera and species which are common to both the redwood and Sierran forests. The two modern forests are in all probability climatic segregates from this Tertiary association.

The closed-cone pine forests of the coast offer evidence of similar but much more recent segregation. Palaeontological evidence supports the conclusion that from the Pliocene through the Pleistocene the forest was more continuous than at present, and was largely dominated by Pinus radiata. Today there is marked segregation into highly localized areas combined with a strong tendency toward local variations peculiar to each region.

Climatic segregation likewise may account for relationships between widely separated floras. The extensive Miocene forest contained genera and species whose modern equivalents are now discontinuous in such widely separated areas as the Mediterranean region, the Himalaya Mountains, eastern Asia, the Pacific coast of North America and southeastern United States.

It would seem therefore that floristic differentiation is the product of climatic segregation that our California forests owe their distinctive caste to this biogeographic process.

Some recent conclusions on the morphology of the plant-body. By Dr. D. H. Campbell, Department of Botany, Stanford University. Botanists, as a class, are extremely conservative regarding the principles dealing with plant morphology. Most of the text-books still retain the same ideas as to the homologies of the plant-body that have been current for a century or more. The generally accepted theory, for instance, that the various organs of the vascular plants can be referred to one of three fundamental organs—stem, leaf, root—can hardly be maintained in view of the facts revealed by modern studies in comparative morphology derived from both fossil and living forms. The methods of the zoologist, dealing with highly individualized organisms, are not applicable to the much less highly organized plants, whose organs, *e. g.*, leaves, are often temporary, and most of whose cells are much less specialized than those composing the tissues of most animals. The attempts to build up an elaborate system of skeletal structure in plants, based upon the theory of a primitive axis traversed by a "protostele" from which all the more specialized types have been derived, is not borne out by developmental study of the tissues in the primitive ferns, where in some cases, *e. g.*, Ophioglossum, there are no cauline steles.

Recent important discoveries of early Devonian vascular plants, show that these had an undifferentiated plant body, with no special organs, such as leaves and roots. They did, however, bear extremely simple sporangia, showing marked resemblance to the sporogonia of certain liverworts. The simplest of these Devonian plants, the Rhyniacea, show a remarkable resemblance to the Anthocerotaceae, which the writer has long maintained, most nearly, among living plants, resemble the ancestors of the first vascular plants. This theory has been greatly strengthened, both by the discovery of the Rhyniaceae, and also that of some remarkable specimens of Anthoceros fusiformis, collected by Dr. G. J. Peirce in August, 1922, near Carmel. Some of these had sporophytes six inches long, and had evidently survived from the previous rainy season. These sporophytes had developed an unusual amount of chlorophyll-bearing tissue, a large central strand of conducting tissue, and a large foot, apparently capable of absorbing water without the intervention of the gametophyte, which showed evidences of disintegration. Except for the presence of a few tracheids in the axial stele, a cross-section of Rhynia is hardly distinguishable from that of these large Anthoceros sporophytes.

The oldest organ of the vascular plants is the sporangium, and the pollen-sacs and ovules of the flowering plants are descended from the very primitive sporangia of some such simple Devonian plants as the Rhyniaceae, and through these from Anthoceros-like ancestors.

The vascular plants are probably of polyphyletic origin—not all derived from a single ancestor—a sort of plant Adam. Among the early Devonian fossils are types which seem to anticipate each of the principal classes of existing Pteridophytes.

Botanical Field Work in Lower California. By Dr. Ira L. Wiggins, Department of Botany, Stanford University. Dr. Wiggins emphasized the importance of secondary exploration of known areas. Although less spectacular than pioneering, and less likely to result in the discovery of new species, this later work is more critical and no less essential. There are gaps in the knowledge which need to be filled. Species must become more fully known, their habits observed, their ranges more accurately limited. After a brief survey of the history of botanical exploration in Lower California, Dr. Wiggins illustrated by a series of interesting slides many distinctive species as well as the major plant associations and general topography of the region.

The Annual Dinner. The annual dinner of the Society, following the general afternoon session, was held in the evening at the Rockefeller International House, University of California, Berkeley. Dr.

George J. Peirce, President of the Society, acted as toastmaster. By asking the recently returned travelers to report upon their adventures, Dr. Peirce revived an interesting old-time custom of the Society. Dr. Ira L. Wiggins responded with an account of his sojourn in Lower California. Mr. H. L. Mason told of paleobotanical discoveries in Alaska. Dr. Jens Clausen, with a rapid-fire narrative of his survey of European and American botanical laboratories and institutions of plant genetics, won by general consent of the audience both speed and long-distance records. Letters were read from absent members, from Dr. R. W. Chaney, who wrote from the Panama Canal zone, and from Professor W. T. Horne, who sent greetings from the Citrus Experiment Station at Riverside. The musical numbers presented under the direction of Mr. W. W. Carruth were especially enjoyable.

The principal address of the evening was given by Mr. Lloyd Austin, Director of the Institute of Forest Genetics at Placerville, California. For several years, he said, the Institute of Forest Genetics, formerly the Eddy Tree Breeding Station, has made a study of hereditary variations in Pinus ponderosa, or Western Yellow Pine. The purpose of the investigation has been to obtain knowledge that will help the Institute in its efforts to develop superior new strains of rapid-growing timber trees.

Pinus ponderosa is one of the most widely distributed of all pines, ranging from British Columbia to Mexico, and from the California Coast Ranges eastward to Nebraska. There are two forms that are sufficiently distinct to have been generally recognized by botanists and dendrologists as varieties of this species. The most widely distributed is the variety scopulorum, which occurs throughout the Rocky Mountains. The other is the variety Jeffreyi, considered by some to be sufficiently distinct to constitute a separate species.

To test the inherent vigor of these three forms, we obtained seed from 60 counties in twelve western states and British Columbia. To make possible a comparison of individuals as well as of geographic strains, the collections were made entirely from individual trees, which are marked with permanent aluminum tags. There are 765 of these mother trees, grouped in 126 field plots. The seeds gathered from each tree were sown in four different plots in the nursery, and our results are based upon the average of the four plantings. More than 73,000 measurements of the seedlings were taken to determine their comparative rates of growth under uniform conditions and thereby to obtain a true index of the inherent vigor of the parent trees.

The variety scopulorum was found to be uniformly weak in its hereditary constitution, with the one exception of the Arizona strain, which is fully as vigorous as many of the Pacific Coast forms. Throughout most of the Pacific Coast, Pinus ponderosa is of medium inherent vigor, although there are marked differences between different local strains. The most vigorous strain of all was found in El Dorado County, where three field plots earned an average vigor rating of 9, ratings being from one to ten.

The most interesting general tendency observed is that vigor seems to decrease definitely as elevation increases, at least in the Sierra Nevada. This is especially pronounced in El Dorado County, where the most exhaustive tests have been made. All of the individual trees in this county that received a vigor rating of 10 are, with one exception, growing at elevations below 2,400 feet. All that received a rating of 9 are below 3,100 feet. All ratings of 4 are above 5,100 feet, and all ratings of 3 are above 6,300 feet. The trees of varying degrees of medium vigor are scattered over the central part of the county. From the viewpoint of reforestation, probably the most important of all vigorous trees revealed by the test, is one growing at an elevation of 3,700 feet, which received a vigor rating of 10. This one tree may prove to be the starting point of a new race that is both vigorous and hardy. Likewise of interest is a tree having a rating of 8 and growing at an elevation of 4,700 feet, where winters are severe. In connection with our progeny test experiment, marked differences have also been noted in the characteristics of cones, seeds and seed-wings of individual trees of the same species growing side by side in the forest.

The results have only recently become available and there has been little opportunity to ascertain the reasons for the conditions that exist. One of the simplest explanations is that the differences may be strictly a result of water supply, only the individuals that are inherently vigorous being able to survive the long dry season at the lower elevations. Temperature also may play a part.

The speaker illustrated his very lucid presentation by pictures, charts and models, and demonstrated a successful method of recording graphically the results of experiments. Altogether the lecture proved most interesting and instructive to his auditors. Seventy-five members and guests were present at the banquet and evening lecture.

DEATH OF DR. HARVEY MONROE HALL

It is the custom of the Carnegie Institution of Washington to hold an annual conference in December for the purpose of discussing reports of investigators on its staff and considering plans for future work. Dr. H. M. Hall, Associate in the Division of Plant Biology, went to Washington from Stanford University for this meeting in mid-December, 1931, and to deliver a lecture on "Environment versus Heredity", in connection with the program of lectures. Shortly before this lecture was to have been delivered he was taken ill, and his condition became increasingly serious. Three operations for abdominal abscess were resorted to in succession in an effort to save his life but without avail. He continued to sink and died Mar. 11, 1932.—W. L. J.

NOTES AND NEWS

On Thursday, December 10, 1931, a meeting of the California Botanical Society was held in Room 2093, Life Sciences Building, University of California. The paper of the evening was by Mr. H. L. Mason, Department of Botany, University of California, who gave an illustrated lecture upon "Collecting Plant Fossils on the Alaska Coast," with an account of the early spring vegetation of Alaska, the discovery of fossil redwood on St. Lawrence Island, native life and customs in the far north and the encounter of the ship Northland with the Arctic